

Description

Method for charging for a service in a communication network

Presentation of the inventive problem

In a packet-oriented communication network with service users

5 (e.g. SIP clients), service providers (e.g. application servers) and a switching application broker (e.g. SIP proxy), which for the duration of the service relationship between a service user device (client) and an application server is not linked into this relationship (i.e. is not for example a
10 stateful SIP proxy), it is impossible for the proxy to provide a reliable billing function for registered clients (clients and service providers).

Previous solutions to the problem presented

- Proxy remains in the communication relationship for the
15 duration of the service relationship (stateful proxy), or
- Billing runs separately between application server and client without including the proxy, i.e. the operator of the proxy is exclusively access provider. A complete bill from a single source even for services used can - if at all
20 - only be achieved with major outlay in post processing -> distributed billing functions at the proxy operator and the application server provider. This solution requires on the one hand ensuring that the user of a service is also simultaneously client of proxy and server operator, and on
25 the other hand requires the transfer of data to the central billing generator.

Inventive solution to the problem presented

The invention describes a method as to how, in this type of scenario with client, proxy (= application broker) and

application server, billing which is reliable for all partners can be achieved, which in addition represents a value-added service for the provider of the basic service (operator of the proxy). This provider is thus in a position to offer his end
5 customer reliable billing from a single source with packet-oriented services from the widest range of partner service providers. In this case the basic service provider can appear both as a simple broker of a service and also as an intermediate agent with "rebranding" ("rebranding" is taken in
10 this case to mean the operator of the proxy offering a service of a partner service provider not under the original name of the service but under their own product name).

In the final analysis the purpose of this method is,

- a) To bill registered clients with a credit account in real
15 time with usage charges for requested and used services,
or
- b) To create for registered clients on a regular basis
(e.g. monthly) a uniform overall bill for all services
from different providers used.

20 The method ensures that

- a) The client only pays for what he uses, and
- b) The service provider is paid for his services.

In addition this method creates the conditions for the client
to be able to be shown as an option, even while using the
25 service in real time, what charges for the service have been
accumulated, or for a pre-paid service, how much credit is
still available.

This solution is based on a trusted billing function in which
all partner components (client, proxy/application broker,
30 application server) are linked in while the service is being
used.

Client: Authenticates itself with the proxy and requests the service.

Proxy/application broker: Brokers the service and keeps account of the use of this service by the client.

5 Application server: Offers the service and informs the proxy with tickets about the creation and execution sequence of the service relationship between it and the client.

Figure 1 describes for a realization variant of the invention the relationships of the partner components with each other
10 and the basic execution sequence from the authentication of the client via the service request and service provision through to the billing.

- After the client has authenticated itself with the aid of the proxy to the authentication-authorization-account
15 server (AAA server) (1)/(2) it receives a billing reference (p1) from the proxy together with the information about where the application server is located (destination), which is generated by the proxy for exercising the billing function for the current service usage (3).

20 - The client uses the information which it has received from the proxy to request the desired service from the application server (4). The latter acknowledges the service request to the client (5). The service relationship between client and application server is thus created.

25 - After the service relationship between client and application server has been established, and for as long as the service is being used, the application server creates tickets at regular intervals (e.g. 1 per minute) which are sent to the billing function on the proxy (6). These
30 tickets contain the reference p1, which allows the proxy efficient access to the billing table, and the reference s1, which the server itself has created and with which if necessary it can efficiently access its data later on a

response from the proxy and can end an existing service relationship.

- After receipt of a ticket (6) the proxy determines the client (IP address C1) on the basis of the reference p1 contained in the ticket and requests from the client an acknowledgement of this billing data (7) for each ticket received. If the acknowledgement has not been received after a specific time (e.g. 1 second), the request (7) is repeated once or twice more.
- 10 - After receipt of the acknowledgement request the client verifies the ticket and where necessary sends an acknowledgement to the proxy (8).
- After receipt of an acknowledgement from the client the proxy stores the ticket for subsequent billing creation (9) and informs the server that the client has acknowledged the ticket. In the case of a pre-paid customer the billing function on the proxy updates the customer's credit status.

Special cases for the realization variant of the invention described:

- 20 - Prepaid customer:
If the credit has fallen below a specific threshold the proxy informs the client that the credit is almost used up. This can be done for example at the next request for an acknowledgement for a ticket (7). If the credit is used up the proxy will delete an entry in the billing table and no longer accept further tickets from the application server for this customer and will send a negative acknowledgement for these tickets to the server, whereon the latter will if necessary end the service relationship to the client.
- 30 - Negative acknowledgement by the client to a ticket request (7):

The proxy informs the application server that a ticket has been negatively acknowledged, in which case it returns the reference s1 to the application server. On the basis of the reference s1 the server is then able to end the service
5 relationship to the client.

- Ticket conformation from a client not received despite a number of requests:

The proxy informs the application server that it has been unable to receive an acknowledgement from the client for a
10 ticket, in which case it returns the reference s1 to the application server. On the basis of the reference s1 the server is then able to end the service relationship to the client.

- Timer t1 for billing table entry times out:

15 To ensure the validity of the billing table entry the proxy monitors the entry of the ticket from the server. As soon as a ticket (6) arrives the timer which has been set is reset. When the timer times out the entry in the table is deleted. Any subsequent tickets which might arrive from the
20 server are negatively acknowledged.

Remarks:

- It should be noted that this method does not require the server and/or client to log off from the proxy when the service relationship is ended. Thus a billing ticket is always transmitted in advance to the client for the current
25 billing interval. This ensures that the client does not make use of expensive services without paying for them by simply aborting the service before a billing interval expires in order to avoid being billed for the interval
30 which has elapsed.
- The monitoring timer t1 in the billing table must in any

event be longer than the length of the billing interval which is agreed between client and application server. It must be long enough to avoid a lost (and therefore repeated by the server) ticket message to the proxy leading to the latter declaring the billing table entry invalid.

Simultaneously however t1 must not be selected so that it is too long, in order to avoid for example denial-of-service attacks from malicious clients leading to a restriction of the billing table resources and in the final analysis to a non-availability of these services. A

sensible value for t1 is 2-3 times the length of the billing interval. Since the length of the billing intervals of the individual service relationships (see Fig. 1) can be different, the length of the monitoring timer t1 is

designed to be variable. As soon as the proxy receives a ticket from a server it uses the length of the billing interval specified within it and determines from this the length of t1, to monitor the receipt of the next ticket from the server for this service relationship. Until the receipt of the first ticket from the server a fixed initial uniform value for the billing table is used for this timer (e.g. 5 seconds).

- Possible trust creation measures between client and application server: The conditions for the service relationship (length and costs of the 1st interval, length and costs of the subsequent intervals) are agreed between client and server. By selecting a short 1st interval and where necessary special conditions for this, it can be ensured that in cases where the service is not provided (e.g. server failure, SW error, incompatibility between client and server software) despite a service relationship being established, no disadvantage or only a slight disadvantage arises for the service user.

- On failure of the billing function of the proxy, the application server, as a result of the missing acknowledgement to the ticket, can abort the service relationship to the client if necessary.

5 - On failure of the client the client's billing account is not incorrectly debited by the server since the client is no longer in a position to acknowledge further ticket acknowledgement requests from the proxy (see special cases).

10 - Functionality expandable at the client e.g. by

- i. Accumulation of the billing messages transferred from the proxy and display of these charges at the terminal for billing monitoring in real time.
- ii. Opportunity for end users to reject tickets as an option, e.g. on reaching a specific self-imposed limit of charges.

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The invention can be summarized as follows. The method described allows the operator of a stateless proxy or application broker to offer in a simple manner registered application service providers and registered customers a reliable billing function accurate within definable intervals and trustworthy, by client and server constantly communicating in the background at regular intervals during service provision via an independent third party (proxy) about the charges arising for them and by the billing function also being provided by the independent third party.

Examples of inventive applications

- Information services
- Video services
- Supplementary telephone services, such as Conferences via conference servers

- Mailbox interrogations
- Anonymous billing for gateways which are activated from the public Internet